III. REMARKS

1. Claims 1, 2, 6-9, 11, 13-15,19, 20, 24-27, 29, 32, 33, 37-43, and 54-83 remain in the application. Claims 3-5, 10, 12, 16-18, 21-23, 28, 30, 31, 34-36, and 44-53 have been cancelled without prejudice. Claim 84 is new.

2. Claims 1, 2, 6-9, 11, 13-15, 19, 20, 24-27, 29, 32, 33, 37-43, and 54-81 are not anticipated by Kalevo et al. (WO 98/41025, "Kalevo") under 35 USC 102(b).

2.1. Kalevo fails to disclose or suggest:

> performing an adaptive block boundary filtering operation on a block boundary formed between a first decoded image block on a first side of the block boundary and a second decoded image block on a second side of the block boundary, the first decoded image block having been encoded using a first type of prediction encoding method and the second decoded image block having been encoded using a second type of prediction encoding method,
>
> wherein at least one parameter of the filtering operation is determined based on the types of the first and second prediction encoding methods.

as essentially recited by independent claims 1, 19, 41-43, 54-57, and 68.

Applicant fails to find that at least one parameter of the filtering operation is determined based on the types of the first and second prediction encoding methods in Kalevo.

The Examiner argues that in Kalevo, the parameters of the filtering operation are determined based on the prediction method 17. Applicants respectfully disagree. Page 5, line 10 through page 6, line 14 of Kalevo discloses how some of the parameters are selected:

> Figure 2 shows the location of the pixels r_l - r_6 and l_1 - l_6 in relation to the vertical block boundary 30. For implementing the method according to the invention, certain parameters must be specified at first. The parameter n is

the largest number of pixels to be examined from the block boundary to one direction, and its value is 6 in the case of Figure 2. It is practical to select the value of the parameter n so that it has a certain relation to both the difference of the pixel values A across the block boundary and to the size of the quantization step QP of the coefficients received as the result of the coding. The following definition is recommended for use here:

$$n = \begin{cases} 0 & \Delta \geq 2.00\alpha \\ 1 & 1.50\alpha \leq \Delta < 2.00\alpha \\ 2 & 1.00\alpha \leq \Delta < 1.50\alpha \\ 3 & 0.66\alpha \leq \Delta < 1.00\alpha \\ 4 & 0.40\alpha \leq \Delta < 0.66\alpha \\ 4 & 0.25\alpha \leq \Delta < 0.40\alpha \\ 6 & 0 \leq \Delta < 0.25\alpha \end{cases} \qquad (2)$$

wherein α = QP-log(QP). If QP has a different value in blocks on different sides of the block boundary, the smaller value of QP is used in calculation, as well as in all cases presented hereinafter, in which a definition includes reference to one QP value only. The invention does not limit the determination of the value of parameter n, but according to the guidelines of the definition (2) it is advantageous that its value is generally higher when the difference of pixel values A across the block boundary is small in comparison to the size of the quantization step QP of the coefficients received as the result of the coding transformation. If the difference between the pixel values A is very large, there is probably a real image edge at the block boundary, and the pixels are not examined at this point for filtering at all (n=0). The next step is to determine the values of the parameters d_l and d_r, which represent activity, or the differences of pixel values between pixels on one side of the block boundary. For the parameter d_r, one preferred definition is the following:

$$\begin{aligned} & d_r = 6, \text{if } \left|r_1 - r_j\right| \leq \beta / j \text{ with all } j \in [1,6] \\ & \text{otherwise}: d_r = i, \text{where i must meet the conditions} \\ & i \in [1,n], \\ & \left|r_1 - r_{i-1}\right| > \beta / j, \text{and} \\ & \left|r_1 - r_j\right| \leq \beta / j \text{ with all } j \in [1,i] \end{aligned} \qquad (3)$$

Here the auxiliary parameter β = 4.log(QP). The value of the parameter d_l is determined similarly, except that all r's are replaced by l's. The number 6 occurring in the definition (3) is the result of the fact that the highest

> possible value of n is 6 according to the definition (2). If n is defined differently, but the parameters d_r and d_l are defined according to definition (3), the number 6 must be replaced by the highest possible value of n according to the new definition."

Furthermore, page 4, lines 9-20 of Kalevo disclose that the number of pixels to be corrected, the characteristic features of the filter being used, and the size of the filtering window depend on a) the difference of pixel values across the block boundary, b) the size of the quantization step QP of the coefficients received as the result of the transformation used in the coding, and c) the differences of the pixel values between the pixels on the same side of the block boundary.

It is clear that the selection of the value of the parameter n is dependent on the difference of pixel values across the block boundary and the size of the quantization parameter QP. However, the quantization parameter QP <u>is not selected on the basis of a predictive encoding method</u>. Kalevo gives no details on the operation of the motion compensation and prediction block 17 except for page 1, lines 16-20 that disclose that the frame saved in the frame memory is read as a reference frame and in the motion compensation and prediction block 17 the frame is transformed into a new prediction frame according to the formula (1).

Kalevo's Figure 3 is cited by the Examiner as indicating that e.g. D-parameters, QP, etc. are determined based on the prediction coding method. Applicants respectfully disagree. Figure 3 does not provide any indication at all regarding selection of the parameters on the basis of the prediction encoding method. Figure 3 shows a connection from the motion compensation and prediction block 17 to the differential summer 11 and to the summer 15. The differential summer 11 performs calculations between pixel values of a current frame and a prediction frame to form a differential frame, which is coded and decoded to form a decoded differential frame. The decoded differential frame is summed in the summer 15 to the prediction frame to form a decoded frame which is stored into the frame memory 16.

Applicants respectfully submit that there is nothing in Kalevo which discloses or suggests that different predictive encoding methods are even used. In other words, Kalevo fails to disclose first predictive encoding method and the second predictive encoding method of the present claims. In addition, there is no indication in Kalevo related to examining the types of the first predictive encoding method and the second predictive encoding method to determine a value of at least one parameter.

At least for these reasons, Applicants submit that Kalevo does not anticipate independent claims 1, 19, 41-43, 54-57, and 68, and dependent claims 2, 6-9, 11, 13-15, 20, 24-27, 29, 32, 33, and 58-67.

2.2. Applicants submit that Kalevo fails to anticipate certain dependent claims not only because of their dependency but also because of the subject matter they include. In particular, Kalevo fails to disclose or suggest the features of claim 29, that is:

> wherein a filter is arranged to truncate the number of pixels selected for examination in dependence on the type of prediction encoding method used to encode an image block in the environment of the block boundary.

Kalevo has no disclosure related to truncating pixels at all, let alone truncating a number of pixels selected for examination depending on the type of prediction encoding method used to encode an image block.

2.3. Kalevo also fails to disclose that a filter is arranged to operate adaptively according to the block types of the frame in the environment of the block boundary, where a block type is defined according to the coding method for the block, as recited by claims 37-40.

Applicant finds no disclosure related to operating a filter according to a block type as defined by the claims. As argued above, Kalevo discloses various factors for determining the features of a filter, but none include operating a filter according to the block types of the frame in the environment of the block boundary.

Therefore, Kalevo fails to anticipate independent claims 37-40.

2.4. Kalevo also fails to disclose performing a filtering operation on a block boundary that is dependent at least in part on a prediction encoding method used to encode an image block on a first side of the block boundary, as recited by claims 69 and 70.

As argued above, Kalevo utilizes a limited set of factors for determining a number of pixels to be corrected, characteristic features of a filter to be used and a filtering window size. The factors disclosed are: the difference between pixel values across a block boundary to be filtered; the size of the quantization step of the transformation coefficients used in transformation coding of the image blocks; and differences in values between pixels on the first side of the block boundary and corresponding differences between pixels on the second side of the block boundary.

There is no disclosure in Kalevo related to a filtering operation on a block boundary that is dependent at least in part on a prediction encoding method used to encode an image block on a first side of the block boundary.

At least for these reasons, Kalevo fails to anticipate independent claims 69 and 70 and dependent claims 71-73, 82 and 83.

3.0 Claim 84 is new and is directed to a method comprising:

> performing an adaptive block boundary filtering operation on a block boundary formed between a first decoded image block on a first side of the block boundary and a second decoded image block on a second side of the block boundary, the first decoded image block having been encoded using a first type of prediction encoding method and the second decoded image block having been encoded using a second type of prediction encoding method,
>
> examining the type of the first prediction method and the second prediction method, and

determining at least on parameter of the filtering operation on the basis of the types of the first and second prediction encoding methods.

For all the reasons argued above, there is no disclosure in Kalevo related to the features of claim 84. Therefore, Kalevo fails to anticipate claim 84.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

The Commissioner is hereby authorized to charge payment for any fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,

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